The Department provides each Registered Service Agency with one **FREE** Registered Service Program Manual. Additional manuals can be purchased for $8 each. **CLICK HERE for order form**

Registered Service Program Manual Printed Version Includes:	Web Version
Arizona Revised Statutes	CLICK HERE to Statute web page
Arizona Administrative Code	CLICK HERE to Rules web page
Program Overview	included below in Excerpts
NTEP Overview	included below in Excerpts
Handbook 44 Excerpt	included below in Excerpts
RSA/RSR Application	CLICK HERE to RSA program web page
Placed in Service Report	CLICK HERE to PISR web page
PISR & Manual Order form	CLICK HERE to RSA program web page
Fee Codes	CLICK HERE to fee code web page
Certificates of Conformance samples	none
EPOs	CLICK HERE to link to NIST Handbook 44

EPO 1-E	ELECTRONIC COMPUTING SCALES
EPO 7/8	MEDIUM-CAPACITY SCALES
EPO 28	ODOMETERS
EPO 29	TAXIMETERS
EPO 12	LIVESTOCK AND ANIMAL SCALES (Mechanical - Analog Indicating)
EPO 12-E	LIVESTOCK AND ANIMAL SCALES (Equipped with Electronic Digital Indicators)
EPO 13	VEHICLE AND AXLE-LOAD SCALES (Mechanical - Analog Indicating) Weighbeams and Dials
EPO 13-E	VEHICLE AND AXLE-LOAD SCALES (Equipped with Electronic Digital Indicators)
EPO 21	RETAIL MOTOR-FUEL DISPENSERS SINGLE PRODUCT
EPO 22	REATIL MOTOR FUEL DISPENSERS BLENDED PRODUCT
EPO 26	LIQUEFIED PETROLEUM GAS MOTOR-FUEL DISPENSERS
EPO 27	LIQUEFIED PETROLEUM GAS LIQUID MEASURING DEVICES

ARIZONA DEPARTMENT OF WEIGHTS AND MEASURES REGISTERED SERVICE PROGRAM MANUAL (excerpts)

PROGRAM OVERVIEW

WHY BECOME A REGISTERED SERVICE AGENCY (RSA)?

There are certain benefits assigned only to a RSA for being licensed and having certified equipment, including:

1. A RSR has the authority to remove Out-of-Service and Warning Tags, thus placing the device back into commercial service.

2. A RSR has the authority to place a new or newly installed used device into commercial service.

LICENSE APPLICATION REQUIREMENTS

The Department shall approve a RSA application for licensure providing:

1. the application submitted is complete and accurate;

2. the statutory and Arizona Administrative Code requirements are met;

3. all standards used by the applicant must meet the specifications in NIST Handbook 105 Series

AND are certified as NIST traceable standards.

NOTE RSA's will be scheduled for annual testing for all standards with the Department's Metrology Laboratory. New applicants are required to make the initial appointment with the Metrology Laboratory to have their standards certified. The Department accepts the certification of standards and testing equipment from any state that has standards traceable to NIST, unless the Department finds that a laboratory's standards or testing equipment are not traceable to NIST.

If you are certified in the state of California, the only two NIST-traceable laboratories are LA County and Sacramento.

4. at least one person within the RSA has passed a RSR examination;

5. the proper tees have been received; and

6. no outstanding delinquency payments exist with the Department.

No employee of the RSA can act as a registered service representative (RSR) until the following is determined:

1. acceptable evidence is presented of being fully qualified by training or experience to install, service, repair or recondition a commercial weighing or measuring device;

2. the individual has a thorough working knowledge of all applicable laws, administrative code and polices.

This will be determined through review of the applicants application and through the administration of a written examination. Examination questions will be based on, but not limited to the following:

- applicable sections of ARS Title 41. Chapter 15
- applicable Sections of AZ Administrative Code Title 20, Chapter 2
- NIST Handbook 44 (appropriate section in manual). It is the responsibility of the RSR to obtain the most recent annual copy of the NIST Handbook 44. IT IS HIGHLY RECOMMENDED THAT YOU PURCHASE HANDBOOK 44.
- The department's Registered Service Program Manual.
- NCWM Publication 12 "Examination Procedure Outlines" (appropriate sections)

3. the individual has possession of or available for use, and will use NIST-traceable, calibrated standards and testing equipment; and

4. the proper amount of fees is remitted.

The Department DOES NOT guarantee the work or fair dealing of a RSA or RSR and shall reserve the right to reject the application of any RSA or RSR and to suspend, revoke or refuse to renew **a** license if the RSA or RSR is not qualified to perform the duties required or has been found to be in violation of any provision of ARS Title 41, Chapter 15 or AAC Title 20, Chapter 2.

A license shall not be transferred or reassigned to any other individual or agency.

LICENSEE RESPONSIBILITIES

RSA responsibilities include, but are not limited to:

I. maintenance of all equipment in accordance with the NIST Handbook 44

2. compliance with licensing requirements and timeframes;

3. submission of the original of all Placed in Service Reports (PISR) to the Department on the proper form, within the required timeframes and within prescribed procedures as outlined in ***AAC*** R20-2. 602 (see AAC section of manual);

4. completion of accurate and complete PISRs;

5. certification of all equipment annually in accordance with the schedule set forth by the Department's Metrology Laboratory or other NIST traceable laboratory;

6. reporting of any newly-acquired equipment or changes in certified equipment to the Department within ten (10) calendar days;

7. all new equipment will not be used until certified by a NIST-traceable laboratory; and

8. scheduling any employee, who will be performing the duties of an RSR for a written examination, administered by the Department, prior to that employee performing duties of an RSR. The RSR must pass the written examination prior to performing any RSR duties.

RSR responsibilities include:

1. using only NIST traceable standards;

2. installing a commercial weighing device only if it meets NTEP requirements;

3. pointing out improper equipment to the owner or user;

4. marking any device which does not conform to Handbook requirements "Out of Service";

5. completing the PISR accurately and completely in accordance with AAC R20-2-602 and Department instructions;

6. correcting any other deficiencies in terms of conforming to NIST Handbook 44;

7. returning the tag to the device if the device owner does not wish for the RSR to make any necessary repairs for compliance, which means the device can not be placed into commercial service;

8. adhering to NIST Handbook 44 requirements that the device is set as close as practicable to zero value. The Handbook contains a specific prohibition against using the tolerances *as* an adjustment factor;

9. informing the owner or user if the device is worn to the extent that the device is incapable of maintaining proper adjustments; and

10. removing Out-of-Service tags or Waning tags when work is completed. *An* RSR shall not remove a Stop Sale. Stop-Use tag without official, specific authorization by the Department.

DEPARTMENT ENFORCEMENT

The Department will monitor repairs and installations of each RSR. *A~,* RSA will be notified, in writing, when the Department determines that an improper repair or installation was performed by one of their RSR's. The Department will also notify an RSA if PISRs have not been completed accurately or completely. If workmanship does not improve or PISR procedures are not followed, the Department may find it necessary

to suspend, revoke or not reissue a license to the RSA or RSR.

RSA/RSR LICENSE ANNUAL RENEWAL

An annual license will be issued for each RSA and RSR.

In addition, prior to license renewal, ARS §41-2067F requires annual certification of all RSA standards and testing equipment. The standards must be certified by a NIST-traceable laboratory. The RSA will be notified within thirty (30) days prior to the time and date of their certification appointment. If the RSA can not keep the appointment or if the RSAs standards will be certified by another NIST-certified laboratory, the RSA is requested to call the Departments Metrology Laboratory. Standards that are not certified shall not be used to install, service, repair or recondition a commercial weighing or measuring device NOR can devices be placed in service.

The billing for the annual renewal will be mailed approximately 30 days prior to the renewal date. All payments are due on the first of the month of expiration. Failure to pay the fee will result in the RSAs license expiring and not being reissued until payment is made. Operating as an RSAIRSR during the expiration period could result in enforcement action.

Any changes in the RSA name, address, phone number or RSRs must be noted on the billing and returned with the proper payment (changes should be reported to the Department when they occur.)

A Department listing of the RSA's certified equipment will accompany the annual renewal billing. This listing MUST be verified. Corrections must be noted on the listing and returned with the payment.

If any changes to the license information occur, the RSA is responsible for notifying the Department.

If the licensee is no longer operating as a RSA or RSR, a written notification, on company letterhead, should be submitted to the Department within 30 days. If certified equipment is sold, the Department should be notified, in writing, of the following:

I. equipment type;
2. equipment serial number;
3. the disposition of that equipment.

NATIONAL TYPE EVALUATION PROGRAM (NTEP)
REGULATORY POLICY AND NATIONAL OVERVIEW

DEFINITIONS

AAC	means the Arizona Administrative Code where Department of Weights and Measures administrative rules are located.
CLC	means the Concentrated Load Capacity.
C OF C	means the Certificate of Conformance.
C OF C No.	means the Certificate of Conformance number issued by NIST.
NIST	means the National Institute of Standards and Technology.
NCWM	means the National Conference on Weights and Measures.
NTEP	means the National Type Evaluation Program.
ACCURATE	means the performance of a piece of equipment as determined by tests made with suitable standards, conforms to the standard within applicable tolerance and other performance requirements.
CORRECT	means in addition to being accurate, a piece of equipment meets all applicable specification requirements.

NTEP OVERVIEW

NTEP is a program of cooperation between NIST, NCWM, the states and the private sector. This partnership is created for determining, on a uniform basis, conformance of a device with the relevant provisions of NIST Handbook 44 and other pertinent national documents. Arizona adopted the program through rules in 1983. Forty-two (42) states have adopted similar or identical programs.

The purpose of the NTEP is to meet the type evaluation needs of both device manufacturers and weights and measures regulatory officials at the federal, state and local level. The objectives are:

1. To establish a uniform set of criteria and test procedures by which devices intended for commercial use are evaluated.

2. To establish a system of type evaluation so that a device manufacturer can go through one type evaluation and establish device acceptance in all states.

3. To provide a minimum level of assurance to weights and measures officials prior to device installation that a device meets the design requirements and is capable of meeting performance requirements of Handbook 44.

4. To provide weights and measures officials and prospective purchases of devices with a list of devices found to comply with Handbook 44 based upon NTEP.

PROGRAM OVERVIEW

The requirements for commercial weighing and measuring devices are stated in the NIST Handbook 44, which is updated on an annual basis. The requirements for commercial weighing and measuring devices are established through the NCWM, whose membership is comprised of weights and measures officials, representatives of device manufacturers, device users and consumers. Handbook 44 has been adopted by all 50 states either by law or regulation.

Handbook 44 includes device requirements in general terms, since the requirements are applicable to a wide range of weighing and measuring devices. Because the requirements of Handbook 44 are general, a uniform set of specific type evaluation criteria that is used by both the device manufacturers and the regulatory officials is established through the type evaluation program.

A number of states require in law that new models of devices must have an NTEP C of C prior to

installation and commercial use (this is the case in Arizona). Many more states require a type evaluation based upon enforcement policy. A type evaluation is the only avenue available to the states to have some assurance that a device complies
with the influence factor requirements (requirements for accurate operation over a range of temperatures) of Handbook 44. The type evaluation verifies that a device complies with the design requirements and is capable of complying with the performance requirements of Handbook 44.

Type evaluation is only one facet of control in the commercial measurement system. The bulk of weights and measures regulatory authority rests with state and local jurisdictions. Many devices may comply with Handbook 44, but not all devices that comply with Handbook 44 are suitable for every application. It is the responsibility of the enforcement official to verify that devices used in commercial applications are appropriate for the applications in which they are used and that the device owners are maintaining the devices in an accurate and correct condition. The primary activities for weights and measures enforcement are the continuous field inspection and test of these devices.

In a few cases, Congress has given enforcement authority to federal agencies to address specific areas of commerce. The Federal Grain Inspection Service and the Packers and Stockyards Administration of the US Department of Agriculture are two federal agencies that have specific weights and measures authority.

The NIST does not have any enforcement authority. The NIST OWM manages the NTEP as a cooperative program between the NIST, the NCWM, the states and the private sector. The Executive Committee of the NCWM serves as the Board of Governors for NTEP.

A BRIEF HISTORY OF NTEP

Prior to 1985, at least 12 states, the OWM and a number of local weights and measures jurisdictions operated their own type evaluation programs. Device manufacturers were often required to go from one jurisdiction to another with a new model of device and obtain separate type evaluations from each jurisdiction. Not only did this result in considerable expense, but jurisdictions would frequently interpret Handbook 44 requirements differently. Manufacturers often had to design devices with optional methods of operation to satisfy the requirements of different states.

In an effort to develop uniform type evaluation criteria and test procedures and eliminate the need for multiple evaluations, the NCWM established the Task Force on National Type Evaluation in 1976 to explore the possibility of establishing a national type evaluation program. The concept of NTEP is to establish uniform criteria for type evaluation with the objective of a single type evaluation being sufficient to satisfy the type evaluation requirements of all of the states.

The NTEP began operating in October 1984 and includes a Technical Committee on National Type Evaluation to serve as the advisory committee to develop the design criteria and performance tests for type evaluation. The Technical Committee consists of three sectors that address specific types of devices. They are (1) the Weighing Sector which addresses scales that weigh static loads, (2) the Belt-Conveyor Scales Sector which addresses only belt-conveyor scales, and (3) a Measuring Industry Sector which addresses liquid measuring devices. The criteria and test procedures developed by this Committee are published in NCWM Publication 14, National Type Evaluation Program: Administrative Procedures, Technical Policy, Checklists and Test Procedures.

The first NTEP C of Cs was issued in 1985. Laboratories authorized by OWM to perform type evaluations for NTEP perform most of the type evaluations. Laboratories authorized to perform complete NTEP evaluations on scales (including temperature tests) are California, Ohio and New York. The Federal Grain Inspection Service is authorized to conduct evaluations on automatic bulk-weighing systems and grain test scales. The State of Kansas conducts performance tests on scales while the State of North Carolina conducts performance tests on liquid measuring devices. The State of California is also authorized to do the full range of type evaluations on liquid measuring devices. The NIST Force Group performs the NTEP tests on load cells that fall within the range of their NTEP test capability. The NTEP does not conduct type

evaluations on devices for which type evaluation criteria have not been developed, although the devices may be covered by Handbook 44. One exception is new types of equipment for which a standardized criterion does not exist (eg; mass flow meters) but is judged beneficial to evaluate the equipment to develop criteria or standardize requirements before the devices reach significant numbers in the commercial measurement system.

Influence factors requirements for scales took effect in 1986 and were phased in over a two-year period. This added an entirely new dimension to type evaluation. These requirements dictate that scales perform accurately over a temperature range. This requires that NTEP laboratories have environmental chambers in which the scales can be tested. In the case of large capacity scales (scales over 2000-lb capacity), the scales cannot be tested in an environmental chamber. Consequently, main elements and load cells are tested separately for compliance with the influence factor requirements. The NTEP routinely issues C of Cs for indicating elements, weighing elements, and load cells, for complete devices evaluated under NTEP.

REQUESTING TYPE EVALUATIONS

Manufacturers and distributors may request type evaluations by completing one of the application forms in NCWM Publication 14. The manufacturer is encouraged to conduct its own evaluation of a device using the type evaluation criteria before requesting the NTEP evaluation. The NCWM Publication 14 can be purchased from the NCWM. Requests for type evaluation must be submitted to the OWM. A company can request that the type evaluation be performed by a specific NTEP laboratory, but OWM reserves the right to assign the type evaluation to any laboratory based on workload or other relevant considerations.

COST OF NTEP EVALUATIONS

Type evaluations are conducted on a cost reimbursable basis The individual laboratories bill the companies directly for their services. Currently, charges for type evaluations typically range from $45 to $90 per hour. The company requesting the type evaluation is responsible for providing the equipment needed to conduct the evaluation. State weights and measures officials regularly assist in the testing of devices for type evaluation; however, participation by a state or local jurisdiction is at their option. Any costs associated with using the state equipment are the responsibility of the company requesting the type evaluation.

The OWM bills companies receiving C of Cs for the management of NTEP and the processing of C of Cs. These charges are currently $210 if an NTEP laboratory prepares the C of C and $480 if OWM prepares the Certificate. These charges also apply to addenda to C of Cs or the upgrading from a provisional to a full status Certificate.

GENERAL CONSIDERATIONS

1. An NTEP C of C applies to the specific design (model, type, series or family) of a specific manufacturer. The parameters for a particular family of devices are often defined through NCWM Publication 14 or on the C of C.

2. A company that is marketing a device (eg: scales, indicator. load cell, etc.) from a manufacturer and relabeling the device under its own name, must submit a separate request for a C of C to NIST. The request must include a statement that, except for the change in proprietary markings, the device is not changed from the original design. The original manufacturer must also send a conformation letter with the request for the C of C.

3. If a company or individual buys NTEP load cells and an NTEP indicating element and then manufactures a scale from the parts, the complete scale must be submitted for type evaluation to assess its performance characteristics for compliance with NIST Handbook 44.

   For example, a fully electronic scale system consists of three main elements: indicating element; load cells or cell; and a weighing element, which includes the load receiving element SHOULD

ALL OF THESE BE CERTIFIED INDIVIDUALLY BUT NOT AS A UNIT, THE ENTIRE UNIT MUST BE SUBMITTED FOR NTEP APPROVAL.

4. If a device with an existing NTEP C of C is remanufactured by the original equipment manufacturer or authorized agent using original equipment manufacturer parts, no additional evaluation is required. The original C of C applies, provided that the remanufacturing process does not modify the design of the device.

5. The requirement of a device with parts consistent with the design and quality of the original parts does not invalidate the C of C. However, a national policy for the replacement of electronic components (eg: AID converter, circuit boards) has not been adopted.

6. A C of C does not apply to a similar device made by another company, even it the design was copied from a device with a C of C. That device must be submitted for a type evaluation.

7. Load cells from the same or a different manufacturer may be substituted into a scale provided that the load cells to be substituted:

   have been evaluated separately and have a C of C;
   have as many or more verification scale divisions (e-min) for the same application as the load cells previously used in the scale;
   have a minimum verification scales division (e-min) that is suitable for the application (the same basic type as the load cells being replaced); AND
   the load cells can be placed in the scale without modification to the basic design of the load cell mounting assembly.

EXEMPTIONS

The NTEP requirement is to assure weights and measures officials, sellers, users and buyers that a particular model or type of devices is capable of meeting applicable requirements. Under certain circumstances, there may be exemptions to that requirement. Written documentation will be required for requesting exemptions. Exemptions will be limited to the following situations:

1. The device installation occurred prior to July 27, 1983. The grandfather exemption would continue if:

   a. If the device is sold but remains in its original installation.
   b. If the device is in commercial use and is moved from one location to another with no change of ownership.

   The exemption would not continue if:
   a. If the device is sold and moved to a new location.
   b. The device fails to meet performance requirements during an official examination.

2. When modification of an existing device is necessary but NIEP approved replacement elements are not available for that particular reason; applicable NIST Handbook 44 requirements shall be applied.

3. One-of-a-kind types of devices. NTEP policies provide for use of devices that are not normal production models but are constructed for a particular installation. In these cases, the Department makes the decision as to how much testing and evaluation is necessary in order to approve the device. Applicable NIST Handbook 44 requirements shall be applied.

It should be noted that even though the NTEP requirement may be waived for the above exemptions, the Department has the authority to apply any applicable specification, test procedure and other requirement in

NIST Handbook 44. This may include testing over the entire range of the device parameters (eg. Capacity, CLC, flow rate, etc.).

WHAT DOES THIS MEAN IN ARIZONA?

Arizona adopted the NTEP program in 1983. A C of C should come with all new devices. If this is not true, the owner of the device should contact the distributor or dealer to obtain the C of C. In Arizona, a C of C is required for all commercial devices.

ARIZONA LEGAL REQUIREMENTS

AAC R20-2-202. Handbook 44

As required by ARS §41-2064, all commercial devices shall comply with the specifications, tolerances, and other technical requirements set forth in Handbook 44, except as otherwise stated in these rules.

AAC R20-2-203. Approval. Installation and Sale of Devices.

A. All commercial devices installed after January I, 1975 shall be prototype-approved by NIST. All devices installed before January 1, 1975 are exempt from NIST prototype approval.

AAC R20-2-601. Registered Service Agencies and Representatives

C. The Department shall accept certification of standards and testing equipment from any state that has standards traceable to NIST, unless the Department finds that the laboratory's standards or testing equipment are not traceable to NIST.

An owner will be given 14 calendar days to provide proof of NTEP approval, if it can not be determined that the device is NTEP approved at the time of inspection.

REPORTING C OF C NUMBERS FOR NEWLY INSTALLED DEVICES

Registered Service Representatives are required to record the NTEP C of C No. on the Placed in Service Report for all installations.

NEED ADDITIONAL INFORMATION?

For more details on policy regarding the NTEP Program, contact the Arizona Department of Weights and Measures and request a copy of the Arizona National Type Evaluation Program Regulatory Policy.

If you would like more information about obtaining type evaluation or receiving a copy of NIST Publication 14, contact NIST, OWM, Bldg. 101 A617, Gaithersburg, MD 20899. telephone (301) 975-4003.

HANDBOOK 44
SPECIFICATIONS, TOLERANCES AND OTHER TECHNICAL REQUIREMENTS FOR WEIGHING AND MEASURING DEVICES

Sec. 1.10 G-A. Application

G-A.1. Commercial and Law-Enforcement Equipment. - These specifications, tolerances, and other technical requirements apply as follows:

(a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and measuring devices commercially used or employed in establishing the size, quantity, extent, area, or measurement of quantities, things, produce, or articles for distribution or consumption. purchased. offered, or submitted for sale, hire, or award, or in computing any basic charge or payment for services rendered on the basis of weight or measure.

(b) To any accessory attached to or used in connection with a commercial weighing or measuring device when such accessory is so designed that its operation affects the accuracy of the device.

(c) To weighing and measuring equipment in official use for the enforcement of law or for the collection of statistical information by government agencies.

(These requirements should be used as a guide by the weights and measures official when, upon request, courtesy examinations of noncommercial equipment are made.)

G-A.2. Code Application. - This General Code shall apply to all classes of devices as covered in the specific codes. The specific code requirements supersede General Code requirements in air *cases* of conflict. (Amended 1972)

G-A.3. Special and Unclassified Equipment. - Insofar as they are clearly appropriate, the requirements and provisions of the General Code and of specific codes apply to equipment failing, by reason of special design or otherwise, to fall clearly within one of the particular equipment classes for which separate codes have been established. With respect to such equipment, code requirements and provisions shall be applied with due regard to the design, intended purpose, and conditions of use of the equipment.

G-A.4. Metric Equipment. - Employment of the weights and measures of the metric system is lawful throughout the United Slates. These specifications, tolerances. and other requirements shall not be understood or construed as in any way prohibiting the manufacture, sale, or use of equipment designed to give results in terms of metric units. The specific provisions of these requirements and the principles upon which the requirements are based shall be applied to metric equipment insofar as appropriate and practicable. The tolerances on metric equipment, when not specified herein, shall be equivalent to those specified for similar equipment constructed or graduated in the inch-pound system.

G-A.5. Retroactive Requirements. “Retroactive” requirements are enforceable with respect to all equipment. Retroactive requirements are printed herein in upright roman type.

G-A.6. Nonretroactive Requirements. “Nonretroactive” requirements are enforceable after the effective date for:

(a) devices manufactured within a State after the effective date;

(b) both new and used devices brought into a State after the effective date; and

(c) devices used in noncommercial applications which are placed into commercial use after the effective

date.

Nonretroactive requirements are not enforceable with respect to devices that are in commercial service in the State as of the effective date or to new equipment in the stock of a manufacturer or a dealer in the State as of the effective date. *(Nonretroactive requirements are printed in italic type.*)
(Amended 1989)

G-A.7. Effective Enforcement Dates of Code Requirements. - Unless otherwise specified, each new or amended code requirement shall not be subject to enforcement prior to January I of the year following the adoption by the National Conference on Weights and Measures arid publication by the National Institute of Standards arid Technology.

G-S. Specifications

G-S.1. Identification. - All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:
(a) the name, initials, or trademark of the manufacturer or distributor;

(b) a model designation that positively identifies the pattern or design of the device;

(c) except for equipment with no moving or electronic component parts, a nonrepetitive serial number; and [Nonretroactive as of January 1, 1968]

(d) the serial number shall be prefaced by words, an *abbreviation, or a symbol, that clearly identifies the number as the required serial number. [Nonretroactive as of January 1. 1986]*

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. (Amended 1985, 1991)

G-S.2. Facilitation of Fraud. - All equipment and all mechanisms and devices attached thereto or used in connection therewith shall be so constructed, assembled and installed for use such that they do not facilitate the perpetration of fraud.

G-S.3. Permanence. - All equipment shall be of such materials, design, and construction as to make it probable that, under normal service conditions:
(a) accuracy will be maintained,

(b) operating parts will continue to function as intended. and

(c) adjustments will remain reasonably permanent.

Undue stresses, deflections, or distortions of parts shall not occur to the extent that accuracy or permanence is detrimentally affected.

G-S.4. Interchange or Reversal of Parts.- Parts of a device that may readily be interchanged or reversed in the course of field assembly or of normal usage shall be:
(a) so constructed that their interchange or reversal will not affect the performance of the device. or

(b) so marked as to show their proper positions.

G-S.5. Indicating and Recording Elements.

G-S.5.1. General. - All weighing and measuring devices shall be provided with indicating or recording elements appropriate in design and adequate in amount. Primary indications and recorded representations shall be clear, definite, accurate, and easily read under any conditions of normal operation of the device.

G-S.5.2. Graduations, Indications, and Recorded Representations.

G-S.5.2.1. Analog Indication and Representation. - Graduations and a suitable indicator shall be provided in connection with indications designed to advance continuously.

G-S.5.2.2. Digital Indication and Representation. Digital elements shall be so designed that:

(a) All digital values of like value in a system agree with one another.

(b) A digital value coincides with its associated analog value to the nearest minimum graduation.

(c) A digital value "rounds off" to the nearest minimum unit that can be indicated or recorded.

(d) A digital zero indication includes the display of a zero for all places that are displayed to the right of the decimal point and at least one place to the left. When no decimal values are displayed, a zero shall be displayed for each place of the displayed scale division. Nonretroactive as of January 1. 1986.]

(Amended 1973 and 1985)

G-S.5.2.3. Size and Character. - In any series of graduations, indications, or recorded representations, corresponding graduations and units shall be uniform in size and character. Graduations, indications, or recorded representations that are subordinate to or of a lesser value than others with which they are associated shall be appropriately portrayed or designated. [Made retroactive as of January 1, 1975.1

G-S.5.2.4. Values. - If graduations, indications, or recorded representations are intended to have specific values. these shall be adequately defined by a sufficient number of figures. words, symbols, or combinations thereof, uniformly placed with reference to the graduations, indications, or recorded representations and as close thereto as practicable, but not so positioned as to interfere with the accuracy of reading.

G-S.5.25. Permanence. Graduations, indications, or recorded representations and their defining figures, words, and symbols shall be of such character that they will not tend easily to become obliterated or illegible.

G-S.5.3. Values of Graduated Intervals or Increments. In any series of graduations, indications, or recorded representations, the values of the graduated intervals or increments shall be uniform throughout the series.

G-S.5.3.1. On Devices That Indicate or Record in More Than One Unit. - On devices designed to indicate or record in more than one unit of measurement, the values indicated and recorded shall be identified with an appropriate word, symbol, or abbreviation. (Made retroactive 19901 (Amended 1978, 1986)

G-S.5.4. Repeatability of Indications. - A device shall be capable of repeating, within prescribed tolerances, its indications and recorded representations. This requirement shall be met irrespective of repeated manipulation of any element of the device in a manner approximating normal usage (including displacement of the indicating elements to the full extent allowed by the construction of the device and repeated operation of a locking or relieving mechanism) and of the repeated performance of steps or

operations that are embraced in the testing procedure.

G-S.5.5. Money Values, Mathematical Agreement. Any recorded money value and any digital money-value indication on a computing-type weighing or measuring device used in retail trade shall be in mathematical agreement with its associated quantity representation or indication to the nearest 1 cent of money value. This does not apply to auxiliary digital indications intended for the operator's use only, when these indications are obtained from existing analog customer indications that meet this requirement. (Amended 1973)

G-S.5.6. Recorded Representations. - Insofar as they are appropriate, the requirements for indicating and recording elements shall be applicable also to recorded representations. All recorded values shall be printed digitally.
[Made retroactive 1990] (Amended 1975)

G-S.5.6.1. Recorded Representation of Metric Units on Equipment with Limited Character Sets.
- The appropriate defining symbols are shown in Table 1. (Added 1977)

G-S.5.7. Magnified Graduations and Indications. -All requirements for graduations and indications apply to a series of graduations and an indicator magnified by an optical system or as magnified and projected on a screen.

G-S.6. Marking Operational Controls, Indications, and Features. - *All operational controls, indications, and features, including switches, lights, displays, push buttons and other means, shall be clearly and definitely identified. The use of approved pictograms or symbols shall be acceptable .[Nonretroactive as of January 1. 1977.]*(Amended 1978, 1995)

G-S.7. Lettering. - All required markings and instructions shall be distinct and easily readable and shall be of such character that they will not tend to become obliterated or illegible.

G-S.8. Provision for Sealing Electronic Adjustable Components*. A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made* to *any electronic mechanism. INonretroactive as of January 1. 19%.]*

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.
(Added l985) (Amended 1989 and 1993)

1.10. General Code

Table 1. Representation of Units

Name of Unit	International Symbol	Representation Form I (double case)	Form II (single lower case)	Form II (single upper case)
BASE SI UNITS				
meter	m	m	m	M
kilogram	kg	kg	kg	KG
DERIVED SI UNITS				
newton	N	N	n	N
pascal	Pa	Pa	pa	PA
watt	W	W	w	W
volt	V	V	v	V
degree Celsius	°C	°C	°c	°C
OTHER UNITS				
liter	l or L	L	l	L
gram	g	g	g	G
metric ton	t	t	tne	TNE
bar	bar	bar	bar	BAR

G-N. Notes

G-N.1. Conflict of Laws and Regulations. - If any particular provisions of these specifications, tolerances, and other requirements are found to conflict with existing State laws, or with existing regulations or local ordinances relating to health, safety, or fire prevention, the enforcement of such provisions shall be suspended until conflicting requirements can be harmonized; and such suspension shall not affect the validity or enforcement of the remaining provisions of these specifications, tolerances, and other requirements.

G-N.2. Testing With Nonassociated Equipment. -Tests to determine conditions, such as radio frequency interference (RFI), that may adversely affect the performance of a device shall be conducted with equipment and under conditions that are usual and customary with respect to the location and use of the device. (Added 1976)

G-T. Tolerances

G-T.1. Acceptance Tolerances. - Acceptance tolerances shall apply to:

(a) equipment to be put into commercial use for the first time;

(b) equipment that has been placed in commercial service within the preceding 30 days and is being officially tested for the first time;

(c) equipment that has been returned to commercial service following official rejection for failure to conform to performance requirements and is being officially tested for the first time within 30 days after corrective service;

(d) equipment that is being officially tested for the first time within 30 days after major reconditioning or overhaul; and

(e) equipment undergoing type evaluation. (Amended 1989)

G-T.2. Maintenance Tolerances. - Maintenance tolerances shall apply to equipment in actual use, except as provided in G-T.1.

G-T.3. Application. - Tolerances "in excess" and tolerances "in deficiency" shall apply to errors in excess and to errors in deficiency, respectively. Tolerances "on overregistration" and tolerances "on underregistration" shall apply to errors in the direction of overregistration and of underregistration respectively. (See Appendix D, Definitions.)

G-T.4. For Intermediate Values. - For a capacity, indication, load, value. etc., intermediate between two capacities, indications, loads, values. etc., listed in a table of tolerances, the tolerances prescribed for the lower capacity, indication, load, value, etc. shall be applied.

G-UR. User Requirements

G-UR.1. Selection Requirements.

G-UR.1.1. Suitability of Equipment. - Commercial equipment shall be suitable for the service in which it is used with respect to elements of its design, including but not limited to its weighing capacity (for weighing devices), its computing capability (for computing devices), its rate of flow (for liquid-measuring devices), the character, number, size, and location of its indicating or recording elements, and the value of its smallest unit and unit prices. (Amended 1974)

G-UR.1.2. Environment. Equipment shall be suitable for the environment in which it is used including but not limited to the effects of wind, weather, and RFI. (Added 1976)

G-UR.l.3. Liquid-Measuring Devices. - To be suitable for its application, the minimum delivery for liquid-measuring devices shall be no less than 100 divisions, except that the minimum delivery for retail analog devices shall be no less than 10 divisions. Maximum division values and tolerances are stared in the specific codes. (Added 1995)

G-UR.2. Installation Requirements.

G-UR.2.1. Installation. - A device shall be installed in accordance with the manufacturer's instructions, including any instructions marked on the device. A device installed in a fixed location shall be so installed that neither its operation nor its performance will be adversely affected by any characteristic of the foundation, supports, or any other detail of the installation.

G-UR.2.1.1. Visibility of Identification. Equipment shall be installed in such a manner that all required markings are readily observable. (Added 1978)

G-UR.2.2. Installation of Indicating or Recording Element. - A device shall be so installed that there is no obstruction between a primary indicating or recording element and the weighing or measuring element; otherwise there shall be convenient and permanently installed means for direct communication, oral or visual, between an individual located at a primary indicating or recording element and *an* individual located at the weighing or measuring element. [See also G-UR.3.3.]

G-UR.2.3. Accessibility for Inspection, Testing, **and Sealing Purposes.** - A device shall be located, or such facilities for normal access thereto shall be provided, to permit:

(a) inspecting and testing the device;
(b) inspecting and applying security seals to the device; and

(c) readily bringing the testing equipment of the weights and measures official to the device by customary means and in the amount and size deemed necessary by such official for the proper conduct of the test.

Otherwise, it shall be the responsibility of the device owner or operator to supply such special facilities, including such labor as may be needed to inspect, test, and seal the device, sad to transport the testing equipment to and from the device, as required by the weights and measures official. (Amended 1991)

G-UR.3. Use Requirements.

G-UR.3.1. Method of Operation. - Equipment shall be operated only in the manner that is obviously indicated by us construction or that is indicated by instructions on the equipment.

G.UR.3.2. Associated and Nonassociated Equipment. - A device shall meet all performance requirements when associated or nonassociated equipment is operated in its usual and customary manner and location. (Added 1976)

G-UR.3.3. Position of Equipment. - A device or system equipped with a primary indicating element and used in direct sales, except for prescription scales, shall be so positioned that its indications may be accurately read and the weighing or measuring operation may be observed from some reasonable "customer" and "operator" position. The permissible distance between the equipment and a reasonable customer and operator position shall be determined in each case upon the basis of the individual circumstances, particularly the size and character of the indicating element. (Amended 1974 and 1998)

G.UR.3.4. Responsibility, Money-Operated Devices. - Money-operated devices other than parking meters shall have clearly and conspicuously displayed thereon, or immediately adjacent thereto, adequate information detailing the method for the return of monies paid when the product or service cannot be obtained. This information shall include the name, address, and phone number of the local responsible party for the device. This requirement does not apply to devices at locations where employees are present and responsible for resolving any monetary discrepancies for the customer. (Amended 1977, 1993)

G-UR.4. Maintenance Requirements.

G-UR.4.1. Maintenance of Equipment. - All equipment in service and all mechanisms and devices attached thereto or used in connection therewith shall be continuously maintained in proper operating condition throughout the period of such service. Equipment in service at a single place of business found to be in error predominantly in a direction favorable to the device user shall not be considered "maintained in a proper operating condition." (Amended 1973. 1991)

G-UR.4.2. Abnormal Performance. - Unstable indications or other abnormal equipment performance observed during operation shall be corrected and, if necessary, brought to the attention of competent service personnel. (Added 1976)

G-UR.4.3. Use of Adjustments. - Weighing elements and measuring elements that are adjustable shall be adjusted only to correct those conditions that such elements are designed to control, and shall not be adjusted to compensate for defective or abnormal installation or accessories or for badly worn or otherwise defective parts of the assembly. Any faulty installation conditions shall be corrected, and any defective parts shall be renewed or suitably repaired before adjustments are undertaken. Whenever equipment is adjusted, the adjustments shall be made as to bring performance errors as close as practicable to zero value.

G-UR.4.4. Assistance in Testing Operations. - If the design, construction, or location of any device is such as to require a testing procedure involving special equipment or accessories or an abnormal amount of labor, such equipment, accessories, and labor shall be supplied by the owner or operator of the device as required by the weights and measures official.

G-UR.4.5. Security Seal. - A security seal shall be appropriately affixed to any adjustment mechanism designed to be sealed.

G-UR.4.6. Testing Devices at a Central Location.

(a) When devices in commercial service require special test facilities. or must be removed from service for testing, or are routinely transported for the purpose of use (e.g. vehicle-mounted devices and devices used in multiple locations), the official with statutory authority may require that the devices be brought to a central location for testing. The dealer or owner of these devices shall provide transportation of the devices to and from the test location.

(b) When the request for removal and delivery to a central test location involves devices used in submetering (e.g., electric, hydrocarbon vapor, or water meters), the owner or operator shall not interrupt the utility service to the customer or tenant except for the removal and replacement of the device. Provisions shall be made by the owner or operator to minimize inconvenience to the customer or tenant. All replacement or temporary meters shall be tested and sealed by a weights and measure official or bear a current, valid approval seal prior to use. (Added 1994)